ABSTRAK

Urease telah banyak dimanfaatkan dalam bidang kesehatan dan industri. Urease biasanya digunakan dalam bentuk enzim bebas sehingga kemampuan penggunaannya menjadi terbatas. Efisiensi enzim urease dapat ditingkatkan dengan amobilisasi enzim menggunakan matriks alginat. Penelitian ini bertujuan untuk mengetahui cara ekstraksi urease, hasil karakteristik ekstrak kasar dan amobil urease, serta kondisi optimum amobilisasi urease dari biji kecipir pada matriks alginat. Enzim urease yang digunakan pada penelitian ini diekstraksi dari biji kecipir. Biji kecipir digerminasi dan diekstraksi, selanjutnya ekstrak kasar yang diperoleh ditentukan aktivitasnya menggunakan reagen Nessler dan diukur dengan spektrofotometer. Optimasi pembuatan *beads* amobil dilakukan dengan variasi konsentrasi natrium alginat dan waktu pembentukan *beads*. Karakterisasi urease bebas dan amobil dilakukan dengan variasi konsentrasi substrat urea, pH, suhu, penambahan EDTA dan logam, serta stabilitas penyimpanan dan penggunaan berulang bagi enzim amobil. Enzim urease menghasilkan aktivitas optimum pada waktu perkecambahan 8 hari. Amobilisasi urease menunjukkan kondisi optimum pada konsentrasi natrium alginat 5% (w/v) dan waktu pembentukan *beads* 60 menit. Hasil karakterisasi urease bebas memiliki kondisi optimum pada substrat urea 0,2 M, pH 7, dan suhu 35^{o}C. Urease amobil memiliki kondisi optimum pada substrat urea 0,2 M, pH 7, dan suhu 40^{o}C. EDTA, ion logam dalam $CuCl_2.2H_2O$, $ZnCl_2$, $Pb(CH_3COO)_2.3H_2O$, $3CdSO_4.8H_2O$, dan $AgNO_3$ merupakan inhibitor bagi enzim urease bebas dan amobil. Aktivitas enzim urease bebas dan amobil stabil sampai hari ke-8 dengan aktivitas relatif bersisa 53% pada urease bebas dan 50% pada urease amobil. Urease amobil memiliki stabilitas penggunaan hingga 5 kali dengan aktivitas relatif sebesar 48%.

Kata kunci: alginat, amobilisasi, kecipir, urease

ABSTRACT

Urease has been widely used in the health and industrial world. Urease is usually used in the form of free enzyme so that its ability to use is limited. The urease enzyme efficiency can be improved by immobilization using an alginate matrix. This research purpose was to study how to extract urease, characteristic results of crude extract and immobilized urease, and the optimum conditions for urease immobilization from winged bean seeds in the alginate matrix. The urease enzyme used in this research was extracted from the seeds of winged beans. Winged bean seeds were germinated and extracted, the activity of the crude extract was determined using Nessler's reagent and measured by a spectrophotometer. Optimization of making immobilized beads was performed including the sodium alginate concentration and time of beads formation. Characterizations of free and immobilized urease were determined the variations of urea substrate concentration, pH, temperature, addition of EDTA and metals, also the storage stability and repeated use of immobilized enzymes. Urease enzyme with optimum activity shown by the seeds with germination time of 8 days. Urease immobilization showed the optimum condition at 5% (w/v) sodium alginate concentration, and beads formation time of 60 minutes. The results of characterization of the free urease enzyme showed optimum conditions of 0.2 M urea substrate concentration, pH of 7, and temperature of 35^{o}C. The immobilized urease showed optimum conditions of 0.2 M urea substrate concentration, pH of 7, and temperature of 40^{o}C. EDTA, metal ions in $CuCl_2.2H_2O$, $ZnCl_2$, $Pb(CH_3COO)_2.3H_2O$, $3CdSO_4.8H_2O$, and $AgNO_3$ is an inhibitor of the free and immobilized urease. The activity of free and immobilized urease was stable until day 8 with a relative activity of 53% in free urease and 50% in immobilized urease. Immobilized urease has a repeated use stability of 5 times with a relative activity of 48%.

Keywords: *alginate, immobilization, urease, winged beans*